

CLAIMS

What is claimed is:

1. A fuel injector for a gas turbine engine comprising:
 - a mounting flange;
 - a stem extending from a proximal portion at the mounting flange to a distal portion;
 - a nozzle proximate the stem distal portion;
 - a first passageway through the stem and extending from a first inlet to a first outlet at the nozzle, the first outlet comprising a first plurality of apertures;
 - a second passageway through the stem and extending from a second inlet to a second outlet at the nozzle, the second outlet comprising a second plurality of apertures, generally inboard of the first plurality of apertures; and
 - a third passageway through the stem and extending from a third inlet to a third outlet at the nozzle, the third outlet comprising at least one third aperture, generally inboard of the first plurality of apertures.
2. The apparatus of claim 1 wherein:
 - the first passageway has an effective cross-sectional area larger than an effective cross-sectional area of the second passageway; and
 - the effective cross-sectional area of the first passageway is larger than an effective cross-sectional area of the third passageway.
3. The apparatus of claim 1 wherein:
 - along major portions of respective lengths, the first, second, and third passageways are within respective first, second and third conduits.
4. The apparatus of claim 3 wherein:
 - the first passageway includes an outlet plenum.
5. A combustor system for a gas turbine engine comprising:
 - a combustion chamber having at least one air inlet for receiving air;
 - at least a first source of a gaseous first fuel;
 - at least a second source of an essentially liquid second fuel; and
 - at least one fuel injector positioned to introduce the first and second fuels to the air.

6. The system of claim 5 wherein the first and second sources comprise portions of a fuel system having a liquid fuel supply common to the first and second sources, with the second source vaporizing the liquid fuel to form the first fuel.
7. The system of claim 5 further wherein the at least one fuel injector includes:
 - a pilot passageway for carrying a pilot portion of the second fuel;
 - a main liquid passageway for carrying a second portion of the second fuel; and
 - a gaseous fuel passageway for carrying the first fuel.
8. A method for fueling a gas turbine engine associated with a source of fuel in liquid form, the method comprising:
 - piloting the engine with a pilot flow of the fuel delivered to a combustor as a liquid;
 - delivering a first additional flow of the fuel to the combustor as a liquid; and
 - vaporizing a portion of said fuel and delivering the vaporized portion as a second additional flow of the fuel to the combustor as vapor.
9. The method of claim 8 wherein:
 - in at least certain conditions, the first and second additional flows are simultaneous.
10. The method of claim 8 wherein:
 - the first and second additional flows are simultaneous and a mass flow of the second additional flow is 40-70% of a total main burner fuel flow.
11. The method of claim 8 wherein:
 - the vaporizing comprises drawing heat to said portion from at least one system on or associated with the engine.
12. The method of claim 11 further comprising:
 - dynamically balancing a ratio of the first flow to the second flow based upon a combination of a desired heat extraction from the at least one system and a desired total fuel flow for the engine.